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ABSTRACT

Knowledge of the nature of human population growth is necessary to understand the world as well as to manage population-related problems in health, education, and environmental protection. The Second International Science Study asked U.S. students to select the graph that best portrayed the nature of population increases in the past 1,000 years. The results showed that the majority of students tested did not know the history of world population growth and failed to understand its fundamental concepts. The tests were administered to over 20,000 students in more than 1,000 schools during the spring of 1983. The percentage of students who answered the question correctly were: (1) 12th graders studying physics; (44 percent); (2) 12th graders studying advanced biology; (25 percent); (3) 12th graders studying no science; (24 percent); (4) 10th graders studying biology; (18 percent); (5) 9th graders; (16 percent); (6) 5th graders; (10 percent). Selecting the correct answer indicated that students knew that human population grew very slowly until the 18th century and grew more rapidly thereafter. It also indicated students may have had the knowledge that populations increased geometrically as indicated by the "J" shape of the curve on the graph. The answer that students chose most often indicated that students did not know the historical trend of world population and that they believed populations increased arithmetically as indicated by the diagonal line on the graph. When U.S. students complete elementary and secondary school, they should have some understanding of the nature of population growth. The document also includes resources for materials on population information. (SM)

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# DEMOGRAPHIC ILLITERACY

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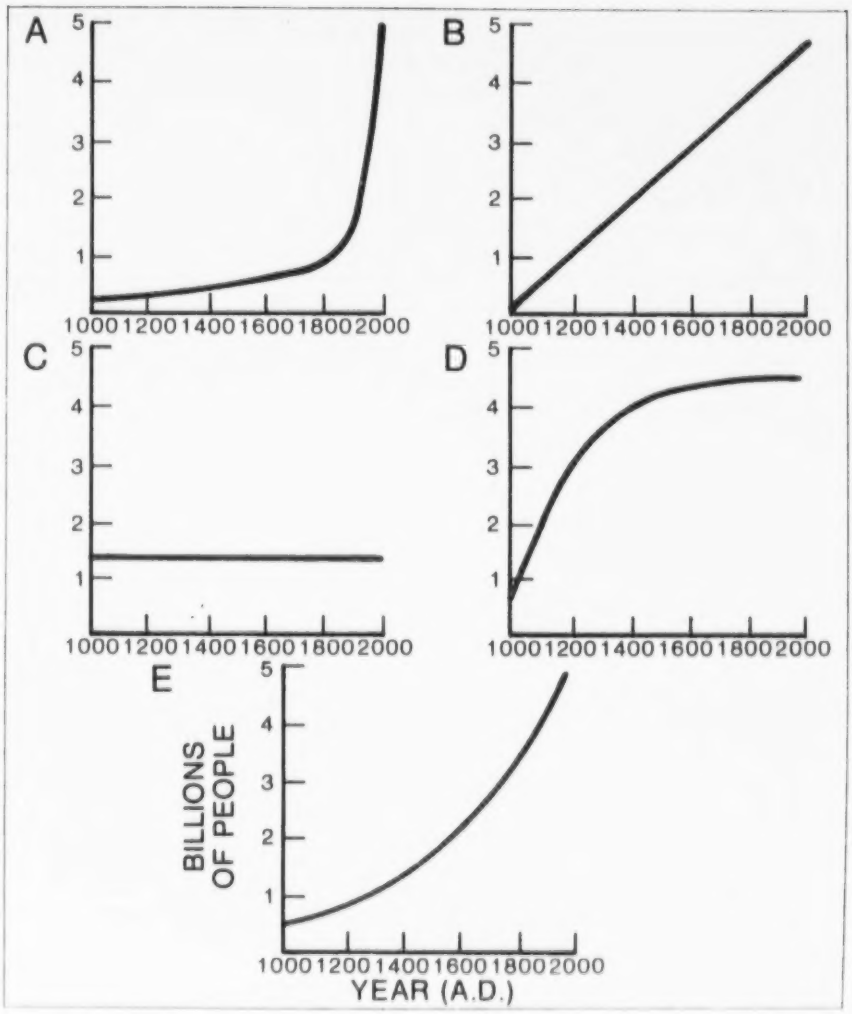
# Demographic Illiteracy

Cultural illiteracy. Geographic illiteracy. Demographic illiteracy? Recent studies have indicated that U.S. students lack common knowledge and basic geographic awareness. Now another study asks: Do our students recognize the patterns of world population growth during the past 1,000 years?

An item in the Second International Science Study asked U.S. students to select the graph which best showed the nature of population growth in the past 1,000 years (see graphs on this page). The results show that the majority of students tested did not know the history of world population growth and failed to understand the fundamental concepts of population growth. An assessment of the study results follows.




Which graph best shows human population growth in the world during the past 1,000 years?

The question and set of graphs to the right was included in the testing carried out in the United States in the Second International Science Study. (The actual graphs used in the test only reached 3 billion.) The tests were administered to over 20,000 students in more than 1,000 schools in the spring of 1983.

Listed below are the students tested and the percent of the sample that answered the question correctly ("A").

| Study Group by Grades | Percent Correct |
|---|---|
| Fifth | 10 |
| Ninth | 16 |
| Tenth (Studying Biology) | 18 |
| Twelfth (Non-Science) | 24 |
| Twelfth (Advanced Biology) | 25 |
| Twelfth (Studying Physics) | 44 |

The correct selection indicates that students knew that the human population grew very slowly until the 18th century and more rapidly thereafter; world population reached 1 billion in 1800 and surpassed the 3 billion mark in the late 20th century (as mentioned before, the graphs in the study only went to 3 billion). It also indicates that the students may have the knowledge that populations increase geometrically – they grow by multiplication, e.g., 3, 9, 27, 81, etc. The "J" shape of the curve indicates geometric growth.

In all samples, less than 50 percent of students responded correctly. As should be expected, students in upper grades did better than those in lower grades. But, why do students learning twelfth grade physics do substantially better than

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twelfth grade advanced science students who are studying a second year of biology? Of special concern are the twelfth graders who were not studying science – future citizens and policymakers: only about one-quarter of these answered the question correctly.

The answers that some students selected shed some light on the extent of their knowledge of world population growth and understanding of the geometric nature of population growth. The most popular choice among the group of fifth graders was graph "B" (chosen by 42 percent). This indicates that these students do not know the historical trend of world population growth and that they also believe it to grow arithmetically, a common mistake made by young people. When a series of numbers increase arithmetically they increase each time by the same amount, e.g., 3, 6, 9, 12, etc. A diagonal line indicates arithmetic growth.

The second most frequent response was graph "E" (22 percent). This could indicate that these students did know about the geometric nature of population growth, but did not know about its history. The correct representation (A) was the response least frequently selected by this group.

Among ninth graders graph "E," which shows geometric growth but inaccurately depicts the actual number of people, was selected most frequently (43 percent). Graph "B" was the second most frequent choice. The correct choice was the third most-frequently-selected among this group.

An understanding of the nature of human population growth is necessary to understanding our world as well as managing population-related problems in health, education, and environmental protection, among others. U.S. students, when they finish elementary and secondary school, should have some understanding of the nature of human population growth. In 1983, a substantial number did not.

Study Results Submitted by: Willard J. Jacobson, National Research Coordinator, International Association for the Evaluation of Educational Achievement.

# RESOURCES

## Requesting Country-Specific Information from PRB

The Population Reference Bureau receives many requests for population information on specific countries/regions. We do our best to respond immediately and appropriately to all requests; however, we have a few tips for those requesting information that will help ensure the proper response. Please be as specific as possible in your request. Let us know if you have a deadline and try to allow at least three weeks for a response. If you are a teacher and are having your whole class write, please send all the letters together with a brief cover letter explaining the assignment and listing the selected countries. (We do not wish to deprive students of a letter-writing activity, however our response can be expedited if we can respond to a whole class at one time rather than numerous individual requests.)

The type of information that you may expect to receive is a brief bibliography of selected sources and handouts or photocopies when available and/or applicable. We do not provide color maps, coins, photos, or stamps.

The list below represents selected reference titles within our library's collection which are useful for basic country profiles. All are issued annually, provide rudimentary information in varying depths, and should be available within a public, university, or high school library. These references can be purchased for a nominal fee.

### General

**Handbook of Nations,** compiled and published by the Central Intelligence Agency and reissued by Gale Research Company. Detroit, MI: Gale Research.

This handbook provides one-page statistical summaries which include data on the economy, government, land, demographics, communications, and national defense of 223 nations. Small country maps are provided.

**Countries of the World and Their Leaders Yearbook,** 2 Volumes, compiled by Gale Research Company. Detroit, MI: Gale Research.

Based predominantly on the State Department's *Background Notes*, the four- to seven-page summaries extend coverage beyond the aforementioned handbook to include travel notes, foreign relations, and principal U.S. officials. Page-size country maps are included.

**The Europa Year Book: A World Survey,** 2 Volumes, compiled by Europa Publications Ltd. London (Distributed in the U.S. by Gale Research). Detroit, MI: Gale Research.

Principal sources used in the compilation of this source include the UN's **Demographic** and **Statistical Yearbooks** and the **FAO Production Yearbook.** The summaries of 176 countries and territories include recent history, economic, and statistical surveys, as well as details of their constitutions.

### Regional

**The Middle East and North Africa; Africa South of the Sahara; The Far East and Australasia; and South America, Central America and the Caribbean,** individual volumes compiled by Europa Publications Ltd. London (Distributed in the U.S. by Gale Research). Detroit, MI: Gale Research.

It is hard to cover the world in one or two volumes, but these represent an excellent series which provides encyclopedic coverage of the countries and regions. Recognized academic experts have signed their contributions. Excellent regional maps are supplied on a variety of subjects.

**Asia-Pacific Report: Trends, Issues, Challenges 1987-1988,** edited by Charles E. Morrison. Honolulu, HI: The East-West Center.

This annual compendium reviews the political and economic developments of the region during the mid-1980s. The 1987-1988 edition focuses on Marine Policies and the New Pacific Island States. It provides concise synopses of the issues facing marine economies and the unique development problems faced by is-

land nations. Maps and tables are liberally used throughout the text.

**Periodicals**

Periodicals are also excellent sources for country information. PRB's own **Population Today** "Spotlight" section has published one-page country/state surveys since 1985 and there is a "Survey Report" featuring an individual country in each issue. **Consumer Markets Abroad** (a 16-page serial until April 1987 called **International Demographics**) devotes each issue to a specific country or metropolitan area. It is published monthly by American Demographics. **The Economist**'s country surveys, published irregularly, are current and noteworthy.

Do not forget **Almanacs.** Coverage is perhaps the briefest of all the previous annuals mentioned; however, they do provide color reproductions of national flags and are widely available.

PRB's annual **World Population Data Sheet** is always a useful source of demographic information. It may be purchased from PRB for $2.00, plus $1.00 shipping. PRB has also compiled population policy papers, ranging from 2-4 pages in length, for 120 countries. These papers are available for $1.00 each (postage included); write to PRB for a listing of countries for which policy information has been compiled. **All orders must be prepaid.**

## Books

**China: Population Education and People,** by Stewart E. Fraser. 1987. Centre for Comparative and International Studies in Education, School of Education, La Trobe University, Bundoora, Victoria 3083, Australia. 200 pp. $20.00 plus $5.00 postage charge. Please prepay with checks made out to Population Education Studies.

This study discusses the many aspects of the development of China's population policy, the impact on national minorities, family planning incentives and disincentives, and the one-child policy. It also contains results of the 1982 Census and resulting demographic projections. The second part of the book contains a translation of a senior high school text on *Population Education* and an account of Ma Yinchu's 30-year-old debate on China's population policy.

## Software

**Social Studies Tool Kit: The World** and **Social Studies Tool Kit: The States** are software packages which allow the user to display, rank, graph, highlight, and map data. They are also capable of making a correlation between two files, performing simple mathematical functions, calculating percentile rankings, and making weighted averages. The charting, graphing, mapping, and calculating tools allow students and teachers to process the information in a way that aids in answering interpretive questions.

**Social Studies Tool Kit: The World** contains data for 151 nations. There are 84 statistics on topics such as population, geography, health care, government, crime, and economics.

**Social Studies Tool Kit: The States** provides tools useful in social analysis plus a large quantity of up-to-date demographic, geographic, political, and social information on the U.S. states.

Both packages were carefully designed by two teachers and provide the tools necessary for easy use by the instructor and a maximum learning experience for the student. The menu-driven program is very "user friendly"; the user need know only how to insert a disk to use the program. Both packages contain computer readiness exercises which prepare the students for interpreting charts, graphs, and maps and provide background for the mathematical components of the program. The classroom application section eases the process of integration for the instructor. Questions and projects for students at different grade levels are included in the packages; the range of activities within the package also makes it easily adaptable to the level of each student.

**Advantages:**

The design of the programs and the packages is conducive to classroom use. New files can be created and added by entering new information or by mathematically adjusting the files.

**Disadvantages:**

Because of the wide variety of functions that these programs can carry (particularly the **World** package) and the large set of data files, the programs require the use of multiple disks, which could become confusing for students. The amount of time used to transfer data files can be enormous as the program is extremely slow. However, with good preparation by the instructor, the amount of disk transfers necessary and classroom time used to copy data files can be minimized.

**Social Studies Tool Kit: The World** and **Social Studies Tool Kit: The States** are designed for use in social studies and math classes in grades 5-12. The programs require an Apple II+, IIc, or IIe (48K) computer. Packages can be purchased for $89.00 each from: Great Lakes Software, P.O. Box 8756d, Green Bay, WI 54308. The **World** package comes with six diskettes and six back-up diskettes. The **States** package comes with four diskettes and four back-up diskettes. Both packages include a clear, comprehensive user's manual.

## New from the World Bank

**Measures of Progress** poster kit series. Kit No. 1 is *Life Expectancy at Birth* and No. 2 is *Population Growth*.

Each kit contains: 1) a 24" × 36" world map on heavy paper with data on 148 countries; 2) six 8½" × 11" color pictures showing scenes of people in the developing world working to improve their lives, with text explaining the process of social and economic development; 3) a 16-page teachers' guide describing a full range of activities using the poster and photographs as well as a test.

The cost of each kit is $6.50 (prices vary outside the U.S.). Send orders to: World Bank Publications, Department 0552, Washington, D.C. 20073-0552.

## New in the AV Library

**The Desert Doesn't Bloom Here Any More,** 1987, 58 minutes, **VHS**. Coronet/MTI Film and Video, 108 Wilmot Road, Deerfield, IL 60015, (800) 621-2131. VHS $250.

This film admirably shows the issues of concern to farmers living near or in deserts in both industrialized and developing nations. Burkina Faso farmers are shown in the first part of the program as they fight the advance of the Sahara Desert. The second part shows how the U.S. government has subsidized the building of irrigation projects, which in the short run have increased agricultural projects, but in the long run have damaged the land and endangered wildlife. Coverage of both low- and advanced-technology innovations shows the complexity of the situation and the lack of simple solutions for meeting the needs of the people and solving environmental problems.

**WETA's Global Links Series**

**Global Links,** 1987, each program 28 minutes, **VHS** (see address and purchasing information below).

**Global Links** is a six-part series of half-hour videotapes with printed materials, which serve as an excellent resource for teaching about social and economic development in developing nations. Programs touch upon the interdependence that affects the economic, political, and social structures of both developing and industrial nations. The teacher/student guides have background reading, glossary, topics for discussion, research activities, and references. The six programs are: "Traditions and the 20th Century," "Curse of the Tropics," "Women in the Third World," "Earth: The Changing Environment," "Education: A Chance for a Better World," and "The Urban Dilemma."

The **Global Links** programs listed above are available for purchase in VHS or ¾" cassettes. Order individual tapes or the entire series (includes training tape). The series can be purchased for $175.00 plus $10.00 for shipping and handling.

Teacher/student guides for both secondary schools or universities can be purchased for an additional $2.50 each. For further information call: (800) 445-1964 or (703) 998-2709. Order from: WETA Educational Activities, P.O. Box 2626, Washington, D.C. 20013.

**Human Numbers, Human Needs.** 1986, 19 minutes, **VHS (NTSC)**.

Based on the International Planned Parenthood Federation's 1984 book, *Human Numbers, Human Needs*, this program completely and concisely discusses the pressures human population growth places on resources and the environment. The program contains the necessary introduction to population dynamics, and then links this growth to food, education, health care, employment, and environmental destruction, among other issues. It offers some solutions to assist in family planning efforts. A slide presentation on videotape, the program's information is delivered in an unbiased, interesting manner.

**Human Numbers, Human Needs** may be purchased from: International Planned Parenthood Federation, 18-20 Lower Regent Street, London SW1Y 4PW, England. The cost is $40.00. Order the NTSC VHS format (this format is compatible with U.S. VHS machines).

The audiovisual programs listed above may be purchased directly from the distributor or rented from the PRB Population-Environment Film Library. The rental fee is $10.00 per film, videotape, or slide program. Send your orders to: PRB Film Library, 777 14th St. NW, Suite 800, Washington, D.C. 20005. For a free copy of the film catalog send a self-addressed stamped envelope to the address above.

## PRB Materials and Memberships

Are you interested in rounding out your *Population Education Interchange* collection? Back issues of *Interchange* are available for $1.00 each; two or more copies, .75 each. Titles include:

- "Demographic Illiteracy," February 1988
- "Where is the Metropolitan U.S.?" December 1987
- "Mexico's Population: A Profile," May 1987
- "Nature's Checks on Population Growth," December 1986
- "A Potpourri of Population Puzzles," May 1986
- "A Guide to Classroom Software," December 1985
- "The Food Crisis in Sub-Saharan Africa," March 1985
- "Charting World Population Change," June 1984

Back issues of the *Population Learning Series* modules, which are accompanied by an issue of *Interchange*, are also available for $2.00 each; two or more copies, $1.75 each. See a list of titles on the back page of the Population Learning Series.

If you find ***Population Education Interchange*** interesting and useful, you would probably enjoy receiving other PRB publications. PRB has a special membership rate for teachers. For only $28 per year, an Educator Member receives four issues of ***Population Education Interchange,*** two ***Population Learning Series*** Modules, The ***World Population Data Sheet,*** The ***U.S. Population Data Sheet,*** four ***Population Bulletins,*** 11 issues of ***Population Today,*** and occasional issues of the ***Population Trends and Public Policy*** series.

To join, send your name, address (and school affiliation, if different from address), and check to: Population Reference Bureau, P.O. Box 96152, Washington, D.C. 20090-6152.

## Interchange Is . . .

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